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10CV834

Eighth Semester B.E. Degree Examination, June/July 2017
Earthquake Resistant Design of Structures

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Use of IS1893-2002 is permitted.

PART – A

1 a. What is plate tectonic theory of origin of earthquakes and explain associated type of movement at the plate boundaries. **(10 Marks)**

b. Explain the characteristics of different types of seismic waves. **(10 Marks)**

2 a. How are the earthquakes classified based on different aspects? **(05 Marks)**

b. Explain the different earthquake ground motion characteristics. **(08 Marks)**

c. Discuss about the response spectrum and design spectrum. **(07 Marks)**

3 a. Write a short note on following code based seismic analysis:

(i) Response spectrum method **(06 Marks)**

(ii) Equivalent static analysis **(04 Marks)**

b. Explain briefly about the seismic design philosophy. **(05 Marks)**

c. What is base isolation? Discuss briefly the principles of base isolation. **(05 Marks)**

4 a. Explain briefly about different types of vertical irregularities and their consequences. **(10 Marks)**

b. Explain /discuss about any five building configuration problems and suggest remedial measures. **(10 Marks)**

PART – B

5 Compute the seismic forces for each storey of a building situated in a seismic zone-IV by equivalent lateral force method as per IS 1893(2002) with following details:

Type of building – 0 MRF (Office building)
No. of storages – 04
Height of the building – 12 m (ht. of each floor = 3m)

Seismic weights

Roof – 2500 kN
All other floors – 3000 kN
Foundation on – Hard rock

(Assume without brick infill condition) **(20 Marks)**

6 For an RCC (SMRF) building with foundation on a soft soil, situated in zone – V as shown in Fig.Q6. Compute the seismic forces for each storey using dynamic analysis procedure.

Given, Free vibration results

Frequency : $\{ W \} = \{47.832, 120.155, 167.0\}$

Modes : $\{ \phi_1 \} = \{1, 0.759, 0.336\}$

$\{ \phi_2 \} = \{1, -0.805, -1.157\}$

$\{ \phi_3 \} = \{1, -2.427, 0.075\}$

$W_1 = W_2 = W_3 = 196.2$ kN

$K_1 = K_2 = 160 \times 10^3$ kN/m; $K_3 = 240 \times 10^3$ kN/m

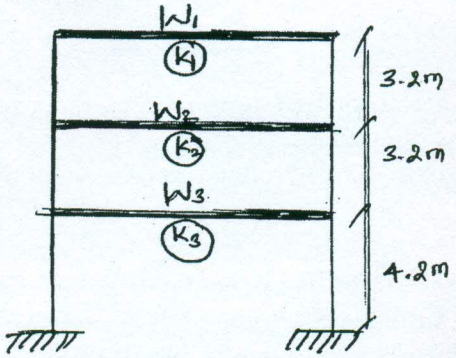

Fig.Q6 **(20 Marks)**

7 a. What are the different load combinations to be used for seismic analysis of RCC buildings as per IS1893(2002). **(04 Marks)**

b. What is ductility? Discuss different factors which are helpful in ductility of RC structures [Reinforced concrete]. **(08 Marks)**

c. Briefly describe soft storey and explain how a frame with soft storey behave under earthquake. Explain special design provisions as per IS 1893. **(08 Marks)**

8 a. Discuss the behavior of masonry buildings during earthquakes representing failure patterns. **(10 Marks)**

b. Discuss the various lateral load resting features that can be introduced in a masonry building for enhanced performance during an earthquake. **(10 Marks)**

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